

ABSTRACT

A method for forming a porous silica film having mechanical strength utilizes a surfactant, one or more kinds of nonionic surfactant(s) having a 0.1 weight % concentration according to the Du Nouy method expression and a surface tension of 45 mN/m or larger at 25°C. is (are) used as a surfactant, a mixed solution obtained by mixing this nonionic surfactant, a hydrolyzable alkoxysilane compound, water and an alcohol is coated on the substrate, and the surfactant in this mixed solution is decomposed or burned out to form a porous silica film. The surfactant is suitably represented by formula $\text{OH}(\text{CH}_2\text{CH}_2\text{O})^x(\text{CH}(\text{CH}_3)\text{CH}_2\text{O})^y(\text{CH}_2\text{CH}_2\text{O})^x\text{H}$ where x and y denote an integer satisfying $1 \leq x \leq 185$ and $5 \leq y \leq 70$, respectively. Alternatively, a mixed solution in which a dimethyldialkoxysilane is added may be used.